

Patent Claims

1. A method for forming an ignitable fuel/air mixture in a combustion chamber of a spark-ignition internal combustion engine with direct injection, in which

- combustion air is fed to a combustion chamber via at least one inlet duct,
- fuel is injected into the combustion chamber by means of a fuel injector which is arranged in the combustion chamber,
- a fuel/air mixture which is formed is ignited by means of at least one spark plug arranged in the combustion chamber,
- wherein the fuel injection takes place in a plurality of part amounts,

characterized

- in that the fuel injection is configured in a homogeneous operating mode of the internal combustion engine in such a way that a first and a second part amount are introduced in the intake stroke, and a third part amount is introduced in the compression stroke, wherein
- the ignition of the fuel/air mixture which is formed takes place at a distance of between 0°C and 100°C after the end of injection of the third part amount.

2. The method as claimed in claim 1, characterized in that the injection period of the third part amount is varied as a function of the load in such a way that it is approximately 5% to 50% of the entire amount of fuel.

3. The method as claimed in claim 1, characterized in that the injection of the first part amount is started in the intake stroke between 300°C and 200°C before the top dead center.

4. The method as claimed in claim 1, characterized in that a period between the end of injection of the first part amount

and the start of injection of the second part amount is approximately 10°CA to 60°CA.

5. The method as claimed in one of the preceding claims, characterized in that the second part amount is varied as a function of the load, and is, under certain circumstances, less than 1% of the entire fuel injection amount.

6. A method for forming an ignitable fuel/air mixture in a combustion chamber of a spark-ignition internal combustion engine with direct injection, in which

- combustion air is fed to a combustion chamber via at least one inlet duct,
- fuel is injected into the combustion chamber by means of a fuel injector which is arranged in the combustion chamber,
- a fuel/air mixture which is formed is ignited by means of a spark plug arranged in the combustion chamber,
- wherein the fuel injection takes place in a plurality of part amounts,

characterized

- in that, in a stratified charge operating mode of the internal combustion engine, the fuel injection is configured in such a way that a first, a second and a third part amount are introduced into the combustion chamber in a compression stroke of the internal combustion engine, wherein
- the injection of the second part amount is ended at a crank angle which lies in a range between 15°CA before the ignition of the fuel/air mixture which is formed to 4°CA after the ignition of the fuel/air mixture which is formed.

7. The method as claimed in claim 6, characterized in that the period between the start of injection of the third part amount and the end of injection of the second part amount is approximately 0.15 to 0.4 ms.

8. The method as claimed in one of the preceding claims, characterized in that the fuel injection nozzle is embodied as an injection nozzle which opens to the outside, in that the fuel from the fuel injection nozzle is injected in the form of a hollow cone.

9. The method as claimed in one of the preceding claims, characterized in that a toroidal fuel/air mixture eddy is formed at the end of the injected fuel hollow cone in such a way that the electrodes of a spark plug which are arranged outside a generated surface of the injected hollow cone are in contact with the toroidal and ignitable fuel/air mixture eddy.

10. The method as claimed in one of the preceding claims, characterized in that the control device of the fuel injection nozzle is driven piezoelectrically.